Attachment A-3: Howard Wesoky's Closing Remarks

Well, here we are again at the end of another hectic but hopefully productive planning exercise. As an engineer, I still prefer doing things rather than planning, but, as a NASA headquarters employee, I do recognize the importance of good planning, as painful as the experience might be.

On Tuesday, I suggested that I'd return to the four questions, which were originally posed at Workshop I in Atlanta. Frank Murray has referred to these questions as "signposts," and indicated that we probably won't fully answer them during these workshops. But it may be good to look at the "signposts" to see how far we've progressed on our journey.

1. What are the impacts of aviation noise and emissions on the environment?

2. How do you believe those impacts may affect the growth of aviation?

3. Must the growth of aviation lead to increased environmental impact?

4. What is the relationship of NASA's noise and emissions goals to aviation's impact on the environment?

Let me take a shot at the individual questions and suggest what we've done to provide answers. And this is another attempt to stimulate discussion, so I will not be offended if you have a different perspective. What's important is that we keep talking and seek consensus. So here's my spin on question #1.

1. What are the impacts of aviation noise and emissions on the environment?

We've attempted to address this question with various scenarios for aviation's growth. You've had an opportunity to discuss those scenarios during yesterday's breakout sessions. And I hope this morning's reports reacted to any concerns about related matters such as plausibility or aggressiveness. We'll open discussion again in a few minutes for additional comments.

2. How do you believe those impacts may affect the growth of aviation?

Nobody has yet expressed a belief that aviation's growth should stop. But the possible degree of noise and emissions mitigation certainly has a wide range.

NASA technologists and others will continue to offer projections, as we've done here, about how we might help. However, before authoritative guidance is offered in return, national and international policy makers will be required to assimilate that information and a lot of other considerations.

Therefore, it's been good to have the participation of the White House, the EPA and FAA in these workshops. And I know that these organizations are consulting with all interested parties - particularly those also here who are responsible for manufacturing and operating aircraft and those representing the public interest in a clean and quiet environment.

So I look forward to the evolving state of affairs, realizing that some ambiguity will likely remain. Although, as a concerned citizen and taxpayer, I hope that decisions will be based on sound principles similar to those used by the International Civil Aviation Organization:

- Scientific assessment of need.
- Technical feasibility.
- Economic reasonableness.

3. Must the growth of aviation lead to increased environmental impact?

As noted in Atlanta, this may be the key question. In the short to medium term, the scenarios seem to indicate that aircraft noise and emissions are likely to increase, even with application of new technology. Although the increase in noise will only occur with growth after the initial phase in of Stage 3 aircraft. In the far term, it appears that a combination of technology and operational measures can bring noise levels back to the early levels of the coming Stage 3 era, and maybe even reduce average community exposure.

For emissions, the situation is less certain. For as long as we keep using carbon-based fuels, it certainly appears that some increase in CO2 is inevitable, again even with new technology. And almost any alternative fuel still has NOx, H2O and cloudiness concerns. But significant improvements in fuel efficiency are possible, and should mitigate the increases in CO2 from the likely kerosene powered aircraft during the next few decades. Advanced combustor technology also promises significant reductions in NOx, which is both a local and global concern. Other fuels are not likely for a long time, but should continue to be studied along with alternatives for the gas turbine engine.

But the most likely "bottom line" seems to be that aviation's current small contribution to degradation of local air quality and global climate change may indeed grow some in the near and even far term because technology and operational measures can not keep up with growth in demand.

I'm sure that's an uncomfortable message for almost everybody, and the issue will likely be debated for some time by policy makers. However, as a technologist, I see an opportunity here, and maybe we will do better than the present fuzzy future appears. I'd like to think the size of the NASA budget has some role in how well we might do, although invention does not always correlate with budget.

4. What is the relationship of NASA's noise and emissions goals to aviation's impact on the environment?

Obviously my NASA colleagues and I hope that the "Three Pillar" goals for reduction of noise and emissions fully address everybody's concerns about aviation's future environmental impact. But, as I indicated at Workshop I, "the goals were originally articulated in a purposely 'dramatic' although somewhat ambiguous manner for Administrator Goldin's overarching message, while allowing later development of appropriately more clear definitions for each of the specific enabling technology areas."

And that's where we are today, still trying to develop the original goals. I believe that you've helped us during the last two and a half days to more fully understand what may be appropriate objectives for mitigating aviation's environmental impacts.

Our response is in the gap analyses and roadmaps that we introduced here, and these will be further developed with the information we've received from you and others.

These are my personal reactions to where we've been. I'll now turn the mic back over to Frank and look forward to your comments.